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Income Diversification and Cost Efficiency Nexus: Empirical evidence from the Asia Pacific banking sector

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Abstract
This study investigates the relationship between income diversification and cost efficiency in the Asia Pacific banking industry, using a fixed effect panel data regression model from 2012 to 2022. The analysis focuses on the effects of different income sources on banking efficiency. Our main finding is that income diversification positively impacts bank efficiency, indicating that banks with diverse income streams tend to operate more efficiently. This result remains robust even when considering the potential effects of income volatility and various moderating variables. While diversification is generally beneficial, our findings suggest that not all diversification is equally advantageous.

Keywords: Income Diversification; Bank Efficiency; Earning Volatility; Asia Pacific

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1.0 Introduction

The banking industry has been forced to alter its business model by broadening the financial services it offers due to trends in deregulation, financial liberalization, and global economic integration all over the world (Hidayat et al., 2012). Limitations imposed on banking operations have consistently been shown to detrimentally affect the efficiency of banks. Research by Chortareas et al., (2012)demonstrated that such restrictions led to heightened levels of inefficiency within banks. Similarly, Barth et al., (2004)asserted a negative correlation between bank efficiency and the extent of restrictions on banking activities. These conclusions were corroborated by other studies conducted by Barth et al.(2004); Haque and Brown, (2017)

Expanding the scope of banking operations across various products and business landscapes has the potential to enhance banking performance significantly. This expansion can mitigate the predictability of bankruptcy costs in the banking sector. Conversely, research by Harimaya and Ozaki, (2021) in Japan suggests that a concentrated income portfolio could diminish bank efficiency, indicating that relying solely on interest income from loans may not be conducive to improved banking performance. Similarly, findings by (Doan et al., 2018)) support the notion that diversifying business activities correlates positively with enhanced bank efficiency. Baele et al. (2007) conducted a study on European banks spanning from 1989 to 2004, revealing that income diversification positively impacted the long-term value of firms.

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This study delves into two conflicting perspectives regarding income diversification and its impact on performance. The first perspective termed the 'strategic-focus' hypothesis posits that diversified banks may encounter challenges in monitoring multiple businesses, leading to heightened agency costs and earning volatility (refer to Deng et al., 2007; Stiroh, 2005; Stiroh and Rumble, 2006). Secondly, the conglomeration hypothesis, conversely the advocates of this hypothesis argue that diversifying banking activities facilitates the optimization of managerial efforts across diverse operational aspects (Gambacorta et al., 2014). This fosters economies of scope by spreading fixed costs across multiple products and mitigating earnings volatility (Gambacorta et al., 2014; Lown et al., 2000)).

This study aims to investigate how non-interest income affects the efficiency of banks in the Asia Pacific region, an evolving area influenced by advancements in technology and worldwide economic integration. Asia Pacific has become an economic force thanks to its vibrant progress and the significant roles played by regional organizations like ASEAN and APEC in promoting trade and investment. Nevertheless, the region is encountering growing obstacles, such as the threat of a decline that emphasizes the importance of banks in broadening their sources of income. Non-interest income has now emerged as alternative revenue for boosting profits and fortitude.

This research differs from previous studies by introducing a novel focus on the moderating role of income volatility in the relationship between income diversification and banking efficiency. Unlike T. L. A. Nguyen, (2018), who analyzed the correlation between bank income diversification and efficiency across six ASEAN countries, Doan et al. (2018) examined the relationship between income diversification and efficiency across 83 countries. A previously unexplored dimension of income volatility is underrepresented. By doing so, it fills a notable gap in the literature. We examine 10 countries of Asia Pacific, including five ASEAN nations that represent more than 30 percent of the total population. While many existing studies have affirmed a positive correlation between income diversification and bank performance—particularly through non-interest income—most have overlooked the volatility of such earnings as a critical variable. To the best of our knowledge, this study is among the rare to examine the implications of income volatility in this context contributing new insights into the nuanced dynamics of bank income diversification and efficiency.

This study aims to make several contributions to the existing literature: (i) It seeks to analyse the influence of income diversification on bank efficiency, particularly within specific Asia Pacific banking sectors, including those in the ASEAN region. (ii) It intends to utilize bank-level data and comprehensive individual-level measurement of bank cost efficiency through the cost frontier model, rather than relying solely on simplistic efficiency ratios such as cost over income from operations. (iii) It aims to investigate the impact of income volatility as a moderating factor on the relationship between bank income diversification and banking performance.

2.0 Literature Review

2.1 *Diversification and Bank Performance*

The relationship between diversification and bank performance centers on two competing hypotheses, namely strategic focus and conglomeration. The conglomeration hypothesis posits that a company can enhance its value by leveraging cost and revenue scope economies through diversifying its operations. In contrast, the strategic focus hypothesis contends that value addition occurs through concentrating on core businesses and competencies. Advocates of the conglomeration hypothesis argue that scope economies can arise from cost synergies, such as shared inputs like customer lists and managerial expertise (Berger et al., 2000; Khan et al., 2020). Additionally, they may exploit revenue scope economies by offering a "one-stop shop" to consumers seeking the added convenience of financial supermarkets (Berger et al., 1996). Conglomeration could enhance financial efficiency and value by establishing internal capital markets less susceptible to imperfections like information asymmetries (Gertner et al., 1994). Moreover, it may diversify risk by spreading earnings, thus reducing expected costs of financial distress or bankruptcy, enabling greater financial leverage, or capturing higher revenues from risk-sensitive customers who value reduced default risk. Conversely, proponents of the strategic focus hypothesis argue that firms optimize value by concentrating on core businesses and competencies (John & Ofek, 1995) this hypothesis is supported by the finding of (Adesina, 2021)

2.2 Income Diversification and Bank Performance

The empirical association between income diversification and bank performance has sparked significant academic discourse in developed markets, yielding mixed results. Moudud-Ul-Huq et al., (2018) assert that diversification yields advantages for banks by capitalizing on economies of scope. The authors elaborate that customer information gleaned from one banking service can be leveraged across various banking services to enhance overall performance, thereby aiming to sustain profitability. Their research further indicates that banks across Indonesia, Malaysia, the Philippines, Thailand, and Vietnam, analyzed throughout 2011-2015, experienced enhanced performance due to diversification. Similarly, in several European nations, Elsas et al. (2010) discovered that diversification bolstered banking profitability (J. Nguyen et al., 2021) and then found a similar association between income diversification and profitability in liberalized markets. Moreover, T. L. A. Nguyen, (2018) elucidates another advantage of diversification in terms of economies of scope, particularly in the distribution of fixed costs across different products. However, income diversification also entails costs primarily associated with banking risk, which encompasses both interest and non-interest income components, as well as the company's expense ratio (Mamun et al., 2023).

In the banking sector, the income portfolio is defined as an increase in the portion of the non-interest income component (Harimaya & Ozaki, 2021). Among the new business lines in the banking industry included in the non-interest income component are investment banking, securities trading, wage-generating activities, and other operations (Alouane et al., 2022). Stiroh & Rumble (2006) state that the components of non-interest income are unstable activities. Therefore, due to its uncertain characteristics, this component generates

several other additional risks, such as market risk, liquidity risk, or operational risk (Moudud-Ul-Huq et al., 2018). Although non-interest income in general increases risk, certain types of non-interest income reduce risk when bank specialization effects are considered (Williams, 2016). According to portfolio theory, a bank may encounter increased risks from income diversification endeavors if non-interest income sources pose higher risks and exhibit a strong correlation with interest income. The research by Mercieca et al., (2007) illustrates that small European banks tend to face heightened risk and diminished profitability due to income diversification.

On the other hand, Wu et al., (2020) found that the diversification of income and funding bolsters bank stability in 39 emerging economies including Central and Eastern Europe, Latin America, and Asia. Similarly, Antao & Karnik, (2022) indicate that income diversification undermines the stability of Asian banking institutions.

2.3 *Income Diversification and Bank Efficiency*

Compared to the extensive body of research exploring the relationship between diversification and factors like banks' market value, profitability, or risk, a smaller pool of studies examines how diversification influences banks' efficiency. It is commonly assumed that combining related activities can reduce banks' operating costs or facilitate more flexible resource allocation across their services, potentially leading to efficiency improvements (Gertner et al., 1994). Studies by Alouane et al., (2022) in Tunisia, Harimaya & Ozaki (2021) in Japan, and Doan et al. (2018) across 83 countries demonstrate a positive correlation between banking income diversification and efficiency levels.

However, several factors may offset these potential efficiency gains in banks with diversified activities. Firstly, greater diversification in business lines and customer bases may escalate monitoring costs for banks without a proportional increase in the overall output of financial services, thus diminishing cost efficiency. Particularly risk-averse bankers might incur significant monitoring expenses to maintain a less risky portfolio, thereby not only reducing cost efficiency but also profit efficiency (Rossi et al., 2009). Secondly, as banks diversify their business activities, they may become overly complex to manage, necessitating increased investment in human capital or more advanced management expertise. Additionally, venturing into new or unrelated business sectors could dilute the banks' core competencies, undermining their efficiency (Markides & Williamson, 1994). Moudud-Ul-Huq, (2020); T. L. A. Nguyen, (2018); Wu et al., (2020) identify a negative correlation between income diversification and bank efficiency.

3.0 Data and Methodology

3.1 Data

This research utilizes yearly data extracted from the financial statements of individual publicly listed banks spanning the period from 2012 to 2022 in the Asia Pacific. They are from the ASEAN 5 region (Indonesia, Malaysia, Thailand, Singapore, and the Philippines. Other bank data come from South Korea, Japan, Hongkong China, and Australia. The data was sourced from the Data Stream database. Our sample comprises commercial banks, excluding Islamic banks due to differences in the structure of their financial statements. The dataset is further refined by excluding banks with missing data for five consecutive years and those lacking key variables such as loans, interest income, and interest expenses, and exhibiting negative values for assets, loans, equity, and interest income. As a result, this limitation decreases the unbalanced panel data sample to 275 banks across 10 countries, comprising a total of a maximum of 3.025 observations. The country's level of economic data such as GDP and Inflation were retrieved from the World Bank data website.

3.2 Model and Method

The empirical regression equation model employed in this study aims to examine the impact of income diversification and volatility earning on bank efficiency at the bank level data, the panel regression model is as follows.

$$Efficiency_{i,t,j} = \alpha + \beta_1\ Div_{i,tj} + \ \beta_2\ VE_{i,tj} + \beta_3\ VE_{i,tj} * Div_{i,tj} + \sum_{k=1}^{2} \gamma_{k,t}\, ME_{i,tj} + \sum_{m=1}^{5} \theta_{m,t}\ BS_{m,i,t} + \ \varepsilon_{i,t,j} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where *i* represented the individual bank, *t* is time, and *j* is the host country where the bank is located.

The dependent variable of Efficiency, this study employs a multi-product translog specification, leading to an empirical cost frontier model structure applied by Pasiouras et al.,(2009)as follows:

$$\begin{aligned} ln\left(\frac{TC_{it}}{P_{2it}}\right) &= \alpha_0 + \alpha_1 lnY_{1it} + \alpha_2 lnY_{2it} + \alpha_3 lnY_{3it} + \beta_1 ln\left(\frac{P_{1it}}{P_{2it}}\right) + \beta_3 ln\left(\frac{P_{3it}}{P_{2it}}\right) \\ &+\frac{1}{2}\alpha_{11}(lnY_{1it})^2 + \frac{1}{2}\alpha_{22}(lnY_{2it})^2 + \frac{1}{2}\alpha_{33}(lnY_{3it})^2 + \alpha_{12} lnY_{1it} lnY_{2it} \\ &+\alpha_{13} lnY_{1it} lnY_{3it} + \alpha_{23} lnY_{2it} lnY_{3it} + \frac{1}{2}\rho_{11}\left(ln\frac{P_{1it}}{P_{2it}}\right)^2 + \frac{1}{2}\rho_{33}\left(ln\frac{P_{3it}}{P_{2it}}\right)^2 \\ &+\rho_{13} ln\left(\frac{P_{1it}}{P_{2it}}\right) ln\left(\frac{P_{3it}}{P_{2it}}\right) + \gamma_{11} lnY_{1it} ln\left(\frac{P_{1it}}{P_{2it}}\right) + \gamma_{13} lnY_{1it} ln\left(\frac{P_{3it}}{P_{2it}}\right) \\ &+\gamma_{21} lnY_{2it} ln\left(\frac{P_{1it}}{P_{2it}}\right) + \gamma_{23} lnY_{2it} ln\left(\frac{P_{3it}}{P_{2it}}\right) + \gamma_{31} lnY_{3it} ln\left(\frac{P_{1it}}{P_{2it}}\right) \end{aligned}$$

$$+\gamma_{33} lnY_{3it} ln\left(\frac{P_{3it}}{P_{2it}}\right) + v_{it} + u_{it} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

TC_{it} : Total cost of each individual bank
Y_n : *Output* to-n number variables (loan, investment, and non-interest income)
P_m : *Input* -m number variables (cost of loans, HR costs, dan capital)
V_{it} : Error
U_{it} : Bank Specific Factors

Div. is diversification income measured by Hirschman–Herfindahl index (HHI) as applied by Elyasiani & Wang, (2012)

$$Div = 1 - \left[\left(\frac{non}{tot - inc}\right)^2 + \left(\frac{net}{tot - inc}\right)^2\right] \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

In this context, "*tot-inc"* represents the total bank income, composed of both non-interest income (referred to as *non*) and net interest income (referred to as *net*). The parameter in the bracket serves as a concentration measure: higher values indicate concentration, whereas lower values indicate diversification. In equation (3), higher values of *Div* signify a highly diversified bank income, while lower values suggest the opposite. Within the same approach, we also measure the diversification within the non-interest income that consists of variables in non-interest namely income fees, trading, and other non-interest income. Furthermore, Earning volatility (VE) is measured by the standard deviation of a bank's earnings (ROA). Vector ME is the macroeconomic variables of each country (GDP and inflation), meanwhile, BS is banking-specific variables of individual banks such as the size of the bank, liquidity of the bank, and bank capital.

4.0 Findings

4.1 *Descriptive Statistic*

Table 1 provides the descriptive statistics for all the data utilized in this research. It indicates that the average percentage of cost efficiency from the whole data is 93.20, thus on average bank could reduce its cost by 6.80 percent. In the dataset encompassing these 10 countries, it is observed that only approximately 36.40 percent of the total income generated by banks constitutes non-interest income on average. Meanwhile, three diversification variables (fee income, trading, and other income) within non-interest income stood at a 39 percent level. Earnings of the bank in this area are quite stable, the three-year volatility on average is 0.9 percent.

Table 1. Descriptive Statistics

Variable	Mean	Std. Deviation	Min	Max
Efficiency	0.9320	0.0266	0.8504	0.9904
Diversification (Div)	0.3640	0.1789	0.0069	0.7258
Div- Fee	0.3984	0.2039	0.0069	0.9410
Div - Trading	0.3996	0.2198	0.0069	1.0000
Div - Other	0.3977	0.2082	0.0002	1.0000
Vol Earning (VE)	0.0009	0.0008	0.0000	0.0036
VE * Div	0.0004	0.0003	0.0000	0.0013
VE * Div Fee	0.0003	0.0003	0.0000	0.0013
VE * Div Trading	0.0004	0.0003	0.0000	0.0015
VE * Div Other	0.0003	0.0003	0.0000	0.0014
ln_size	24.0824	2.0541	18.8873	29.0954
Liquidity	0.7367	0.1452	0.3582	1.1168
ln_Equity	21.4728	1.8932	16.5180	26.3844
GDP Growth	0.0425	0.0893	-0.1690	0.2609
Inflation	0.0203	0.0191	-0.0135	0.0659

3.3 Findings and Discussion

The outcomes of the regression analysis are displayed in Table 2. The dependent variable in this model is cost efficiency, representing the market power of each bank within the respective countries. Panel data regression model (1) is computed using the same level period of the independent variables. The regression results are divided into three sections: the first section presents the regression findings using the entire dataset, the second section displays the regression outcomes for the ASEAN 5 countries, and the final section showcases the results for East Asian countries and Australia.

Table 2. Regression Results – Cost Efficiency as Dependent Variable

Variables	All Country				ASEAN				EAST ASIAN AND AUSTRALIAN			
Diversification (Div)	0.1451	***			0.0886	***			0.2188	***		
	0.0000				(0.0330)				0.0000			
Div- Fee	-0.0870		-0.1386		-0.7394	***	-0.8764	***	0.0496		0.0639	
	(0.4660)		(0.2570)		0.0000		0.0000		(0.6840)		(0.5840)	
Div - Trading	0.1941	***	0.2507	***	0.1340		0.2065		0.1467	*	0.2252	***
	(0.0050)		0.0000		(0.5870)		(0.3770)		(0.0580)		(0.0010)	
Div - Other	0.0577		0.0500		0.7007	**	0.7632	**	0.0025		-0.0890	
	(0.3970)		(0.5030)		(0.0110)		(0.0040)		(0.9690)		(0.2430)	
Volatility Earning (VE)	6.9560	*	1.2194		1.9317		0.8066		-0.4991		-0.1290	
	(0.0790)		(0.7340)		(0.6090)		(0.8540)		(0.9030)		(0.9730)	
VE * Div	-4.3684								5.4249			
	(0.6590)								(0.6470)			
VE * Div Fee	11.0152		22.9685		92.5170		145.1411	***	110.5886		194.5711	**
	(0.8490)		(0.7470)		(0.1260)		(0.0030)		(0.1610)		(0.0150)	
VE * Div Trading	1.2648		-17.6453		12.5047		-77.5795		-53.4335		-225.9232	***
	(0.9840)		(0.8540)		(0.9640)		(0.7750)		(0.4830)		(0.0090)	
VE * Div Other	-29.2933		-11.9421		-105.0144		-60.1964		-76.3185		58.4220	
	(0.6680)		(0.8850)		(0.7090)		(0.8290)		(0.3070)		(0.5660)	
ln_size	-0.0035		-0.0065				-0.0271		-0.0344		0.0360	*
	(0.8190)		(0.6940)				(0.2000)		(0.1890)		(0.0710)	
Liquidity	0.0133		0.0251				0.0363		0.0378		0.0205	
	(0.6200)		(0.3620)				(0.3250)		(0.3680)		(0.5500)	
Ln Equity	-0.0067		-0.0097				0.0243		0.0262		-0.0611	***
	(0.6020)		(0.4920)				(0.1390)		(0.2130)		0.0000	
GDP Growth	-0.0214	**	-0.0216	*			0.0123		0.0024		-0.0243	
	(0.0550)		(0.0510)				(0.5120)		(0.8900)		(0.1510)	
Inflation	-0.0206		-0.0135				-0.0625		0.0068		-0.1135	
	(0.8000)		(0.8610)				(0.5200)		(0.9350)		(0.5150)	
Constant	0.8573	***	1.1008	***	1.2190	***	0.8773	***	0.9874	***	1.1005	***
	(0.0000)		0.0000		0.0000		0.0000		(0.0010)		0.0000	
R square	**9.49%**		**7.43%**		**11.72%**		**14.36%**		**9.57%**		**21.31%**	

	EAST ASIAN AND AUSTRALIAN			
Diversification (Div)				
Div- Fee	0.0496		0.0639	
	(0.6840)		(0.5840)	
Div - Trading	0.1467	*	0.2252	***
	(0.0580)		(0.0010)	
Div - Other	0.0025		-0.0890	
	(0.9690)		(0.2430)	
Volatility Earning (VE)	11.0184	*	-6.3079	-7.2203
	(0.0990)		(0.3940)	(0.3070)
VE * Div			16.6108	
			(0.3750)	
VE * Div Fee	110.5886			194.5711 **
	(0.1610)			(0.0150)
VE * Div Trading	-53.4335			-225.9232 ***
	(0.4830)			(0.0090)
VE * Div Other	-76.3185			58.4220
	(0.3070)			(0.5660)
ln_size			0.0360	* 0.0364 **
			(0.0710)	(0.0780)
Liquidity			0.0205	0.0317
			(0.5500)	(0.3250)
Ln Equity			-0.0611	*** -0.0632 ***
			0.0000	0.0000
GDP Growth			-0.0243	-0.0316 **
			(0.1510)	(0.0670)
Inflation			-0.1135	-0.1770
			(0.5150)	(0.3090)
Constant	0.8411	***	1.2987	*** 1.3249 ***
	0.0000		0.0000	0.0000
R square	**12.61%**		**16.43%**	**20.99%**

Number in parentheses is p-value, asterisk indicates the significance level; * significant at 10%, **significant at 5% and *** significant at 1%.

The regression analysis demonstrates a positive correlation between income diversification and cost efficiency in the Asia Pacific banking industry. This trend persists uniformly across two major sub-regional groups: ASEAN countries and East Asia including Australia, suggesting that this relationship is robust across different economic contexts within the region. This finding aligns with (Alouane et al., (2022); Doan et al., (2018); Harimaya and Ozaki, (2021) who observed that diversified bank holding companies tend to incur lower costs of debt, indicating an enhancement in cost efficiency due to banks' engagement in non-traditional activities. However, in contrast, several other studies present conflicting evidence regarding the efficacy of diversification in enhancing efficiency. The positive impact of diversifying income streams indicates that banks in these areas benefit from reduced operational costs when they expand their sources of revenue beyond traditional banking activities. This diversification likely introduces economies of scale and scope, leading to more efficient use of resources and better risk management.

The analysis of the regression results of the relationship between income diversification and cost efficiency in the Asia Pacific banking industry reveals nuanced insights, especially when disaggregating non-interest income into fees, trade, and other revenues. For the entire sample, the results indicate that only trade income positively impacts banking efficiency, highlighting the significant role of trade-related activities in driving cost-effective operations across the sector. However, a regional breakdown presents more complex dynamics. In ASEAN countries, there is an observed negative impact of income from fees on cost efficiency, alongside a positive correlation between other revenues and cost efficiency. This suggests a unique market characteristic in the ASEAN region where traditional fee-based services might be less efficient or possibly oversaturated. In contrast, the East Asia region, including Australia, aligns with the overall sample's finding, where trade income positively influences banking efficiency, underscoring the pivotal role of trade finance and related activities in these economies.

The relationship between the volatility of income and cost efficiency in the Asia Pacific banking industry presents intriguing insights. Overall, for the entire sample, a positive correlation is observed between income volatility and cost efficiency. This suggests that banks that experience greater fluctuations in their income streams tend to be more cost-efficient. This counterintuitive finding could be indicative of adaptive efficiency - banks that are accustomed to income volatility may develop more robust cost management strategies to buffer against these fluctuations.

However, this relationship diverges when examining regional subsets. In the ASEAN region, the impact of income volatility on cost efficiency is not statistically significant. This could imply that banks in ASEAN countries have either stabilized their income streams to a degree where volatility does not play a significant role, or they have not necessarily translated income volatility into cost-efficiency gains. On the other hand, in the East Asia region, including Australia, the positive impact of income volatility on cost efficiency mirrors the overall sample's trend. This may indicate a higher adaptability or a more dynamic response of East Asian banks to income fluctuations, possibly due to more varied market conditions or diverse banking practices.

The study also explores the interplay between diversification income, income volatility, and their impact on cost efficiency. Initially, both income diversification and volatility independently show a positive relationship with cost efficiency across the entire sample. However, the scenario shifts when income volatility is considered as a moderating factor in the relationship between income diversification and cost efficiency. The results reveal no significant impact in this regard, indicating that the efficiency benefits of income diversification are not strongly influenced by the level of income volatility. This could imply that the benefits of diversification in terms of cost efficiency are inherent and not necessarily dependent on the volatility context. Upon disaggregating diversification into fee income, trading, and other revenues, the results become more nuanced. A significant positive impact is observed when fee income moderates the relationship between diversification and cost efficiency, evident in both the ASEAN and East Asia regions. This finding implies that fee income when paired with diversified income sources, can enhance cost efficiency significantly. Conversely, the interaction between trading and diversification income shows a negative impact on cost efficiency in the East Asia region. This might suggest that in this region, the combination of trading activities with other diversified income sources does not contribute positively to cost efficiency, possibly due to increased complexity or risk associated with trading activities.

5.0 Conclusion and Recommendation

This study conducts empirical tests on a sample of banks from five ASEAN countries: Indonesia, Malaysia, Singapore, Thailand, the Philippines, and five other countries from East Asia and Australia. The dataset comprises 275 banks spanning from 2012 to 2022. Static panel data regression is employed to estimate the coefficients that capture the relationship between income diversification, earning volatility, and the interaction of income diversification and earning volatility on the bank cost efficiency.

The regression analysis reveals a consistent positive association between income diversification and cost efficiency across the Asia Pacific banking industry, evident in both ASEAN countries and East Asia including Australia. This finding aligns with prior studies indicating lower debt costs for diversified banks, suggesting improved cost efficiency due to non-traditional activities. However, conflicting evidence exists regarding the impact of diversification on efficiency. Despite this, diversifying income streams appears beneficial, likely introducing economies of scale and scope, thereby enhancing resource utilization and risk management. Regional nuances emerge, with trade income notably driving efficiency in the overall sample and the East Asia region, while fee income negatively impacts ASEAN's cost efficiency. Interestingly, income volatility shows a positive association with cost efficiency overall, suggesting adaptive efficiency. However, regional differences emerge, with ASEAN banks showing no significant impact, and East Asia, including Australia, mirroring the overall trend. Additionally, the moderating effect of income volatility on diversification's impact on cost efficiency is inconclusive, indicating the inherent benefits of diversification. The disaggregated analysis highlights the significant positive impact of fee income moderating diversification's effect on cost efficiency across ASEAN and East Asia, while trading activities may hinder efficiency in East Asia, possibly due to increased complexity or risk.

There are several limitations of the study that must be discussed. First, the analysis excludes Islamic banks where financial statement structure differs and does not allow generalization of findings to the conventional banking industry. Second, the study uses overall panel data, which, even though this approach is quite robust, may not capture microstructure details of short-run dynamics in bank behavior. Third, while the Hirschman–Herfindahl Index (HHI) is commonly used to quantify income diversification, this quantitative approach might not incorporate all qualitative aspects of income sources. To overcome these limitations and improve our understanding of this topic, future studies should take into consideration the following directions: first, expand the dataset to include Islamic banks and carry out the efficiency dynamics comparison between conventional and Islamic banking models. Second, apply event studies to observe how transitory economic shocks and policy interventions influence income diversification and efficiency. Third, qualitative measures of income diversification strategies should be used to better understand their impact on cost efficiency.

Some practical recommendations for the banking industry in these regions, this finding implies a strategic imperative to embrace diversification. Banks should consider innovating their product offerings and exploring new market segments to broaden their income bases. This strategy not only promises enhanced cost efficiency but also positions these institutions to better withstand economic fluctuations and competitive pressures. Furthermore, the consistent positive relationship across different regions underscores the universal applicability of this strategy in the Asia Pacific context, encouraging regional banking sectors to adopt similar diversification approaches in pursuit of greater efficiency and financial stability. Moreover, Banks in East Asia and Australia should continue to invest in and prioritize trade-related services, as these are contributing to greater cost efficiency. However, the negative impact of fee income on cost efficiency in ASEAN countries suggests a need for banks in this region to reassess their fee-based services. This could involve innovating fee structures, enhancing service efficiency, or diversifying into more profitable service areas.

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Paper Contribution to Related Field of Study

This paper will contribute to banking studies, particularly in the realm of non-traditional activities that generate non-interest income and their impact on bank efficiency.

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